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New Planet.

On the 22d of May a new planet was discovered by M. Goldschmidt. It resembles a star of the 11.12th magnitude. The following approximate positions of it were obtained by him:—

	M. T. Paris.	A. R.	Dec.
	^h ^m	^h ^m ^s	[°] ' "
1856, May 22	10 20	10 22 15	+ 10 11
23	11 30	10 23 1	11 15
25	11 10	10 26 10	+ 11 5

The object observed on the 23d of May does not seem to have been the planet.

The planet discovered on the 31st of March by M. Goldschmidt has been called *Harmonia* in commemoration of the peace.

Observations of Double Stars taken at Madras in 1853, 4, 5, and the beginning of 1856. By Eyre B. Powell, Esq.

The equatoreal with which these observations were taken is the same that was used in obtaining the places of Comet II., 1854, recorded in the *Monthly Notices* for June of that year. The object-glass of the telescope is 4 inches in diameter, with a focal length of 63.2 inches. The mounting of the equatoreal is of the German form; and the right ascension and declination circles, which, with their verniers, read respectively to seconds of time and minutes of space, were intended only to find objects or give a rough approximation to their places. The value of a division of the screw-head was found to be 0".3156. "The instrument," says the author, "is the workmanship of Mr. Simms, and it certainly supports his well-established reputation."

The author then enters into some details with respect to the

mode of observation practised by him. The measures are almost wholly of positions; the author being under the belief that a more powerful instrument and a clock-work movement (which he did not at first possess) were indispensable to the accurate measurement of distances.

The author concludes his introductory remarks with expressing the obligations under which he rests to Captain Jacob for the assistance he kindly afforded him when he began to cultivate an acquaintance with double stars.

The number of stars in the *Catalogue* is 130. Appended to it are a few notes on some of the stars. The following are a few extracts:—

“83. (α *Centauri*.) The observations of this star had extreme care expended upon them. As a general rule, they were taken only when the components were steady and well defined, and the vertical section of the eye was made to coincide with the line of junction of the stars; the position of the observer's head, too, was reversed in the middle of several sets, and many of the angles were measured by daylight.

“The orbit of α *Centauri*, which I laid before the Society in 1854, is undoubtedly erroneous in several particulars; and I believe with Captain Jacob that a thoroughly good set of elements will not be attainable for some years. Still we may arrive at tolerably safe conclusions on certain points. In the first place, it seems likely that the limits within which the period lies are narrower than have been supposed. On drawing the interpolating position and distance curves there is seen to be a necessity for modifying the position and distance for 1831.95 derived from the St. Helena Diff. Decl. = $16''.2$, and Diff. R.A. = $1^s.54$, and therefore for altering the differences themselves. The curves give $P = 216^{\circ} - 40' \pm$, $D = 19''.3 \pm$, and consequently Diff. Decl. = $15''.48$; but Diff. Decl. = $14''.82$ for 1833.0 by Henderson's Cape Observations; hence the annual variation of Diff. Decl. at that time = $-.66$, a result according with the general tenor of the measures. From this it follows that Diff. Decl. = 16.2 corresponds to 1830.8; and as La Caille's Diff. Decl. = 16.2 belongs to $1752.1 \pm$, the period comes out 78.7 years. Again, $P = 216 - 40$, $D = 19.3$, afford a Diff. R.A. = $1^s.543$, which exactly agrees with Mr. Johnson's result, and harmonises fairly with that of Henderson. Taking the Diff. R.A. of the latter as based upon the greater number of observations, and comparing it with Dunlop's, which equals $1^s.783$ for 1826.4, the variation of Diff. R.A. = $-0^s.263$ for 6.6 years, and Diff. R.A. = $1^s.673$ corresponds to 1829.16; but La Caille's Diff. R.A. = $1^s.673$ for $1752.1 \pm$, therefore we have 77.06 years for the length of the period. Using Mr. Maclear's Diff. Decl. $10''.75$ for 1840.0 and the position $223^{\circ} - 10'$ suggested by the interpolating curve, the distance for the same epoch = $14''.74$. Comparing this with Sir John Herschel's distance = 16.18 for 1837.345, -1.44 equals variation of distance for 2.655 years; and $15''.5$ equals the distance for 1838.599. But $15.5 \pm$ is Maskelyne's distance for

1761.5. Consequently the period from these data is 77.099 years. In the note on α *Crucis*, reasons are assigned for believing the space of 79 years to be a superior limit of the period. Combining, then, that result and the preceding ones, it appears highly probable that the period lies between 77 and 79 years.

“By cutting up the area swept over by the projected radius vector since 1826 into various sectors, and examining the latter in connexion with the position and distance curves, the area for the interval between 1826.4 and 1855.318, or 28.918 years, is found to be 57.0954 square seconds, affording an annual sector of 1.974 square seconds. Hence for 77.6 years, a portion of time probably very near the true value of the period, the area is 153.18 square seconds, which, therefore, cannot differ much from the space contained within the apparent orbit. The comparison of the several sectors with the mean areal motion, and the contemporaneous inspection of the position and distance curves, lead us to infer that—the observed distance for 1846.21 is considerably too great—the one for 1848.01 is somewhat too small—and the sector from 1850.37 to 1854.029 also falls short of the true value, owing, probably, to slight errors of defect in the distances. A strong suspicion, moreover, is excited that Dunlop's position is too small, and his distance too great. The comparison of the sectorial areas is of importance for several reasons; among others, inasmuch as it seems almost impossible to reconcile the distance for 1846.21 with that for 1848.01; whence, therefore, it becomes necessary to decide upon the one that should be preferred as more or less of a guide in drawing the apparent ellipse. Mr. Hind's orbit, published in the *Monthly Notices* for January 1855, and one I have lately calculated, present a curious contrast on this point; but both agree in attaching an error of nearly a second to one of the distances. Thus:

Epoch.	P. Obs.	P. Hind.	P. Powell.	D. Obs.	D. Hind.	D. Powell.
	°	°	°	"	"	"
1846.21	232.38	232.92	233.1	10.91	10.34	9.95
1848.01	238.0	237.5	237.95	8.03	8.94	8.55

the sum of the errors of distance being exactly the same for both orbits. Setting aside the internal evidence of the observations, it appears far more likely that the distance for 1846.21 is erroneous to a large extent, than that the distance for 1848.01 should be so. The former is deduced from only sixteen measures, taken at the commencement of a series of observations; the latter is the mean of forty-eight measures, taken after two years' practice. The axes of the apparent ellipse are still involved in a little doubt; the Cape meridional observations of 1842 and 1844 favouring a less eccentric ellipse, and agreeing in this respect with the distance for 1846.21; the measures in general, however, support the idea of the perspective orbit being peculiarly compressed.

“The position of the periastræ is subject to very slight uncertainty; it can differ but little from 32° .

"The measures of 1855 and 6 prove that calculators, myself included, have considerably antedated the time of periastral passage; that event can scarcely happen before 1862.

"Six orbits, which I computed in 1855, introducing the latest measures, and in the graphical part using the scale of a quarter of an inch to a second, and one that I calculated at the beginning of this year, making use of the positions and distances just obtained, and drawing the apparent ellipse on the large scale of half an inch to a second, all agreed in placing the passage in 1862 or 1863 +. At the same time, the observation of Feuillée, in 1709.5, which belongs to a position of the *comes* past the periastron, taken with a period of 78 years, will hardly allow of the passage occurring later than the commencement of 1864.

"To fix with exactitude the node, inclination, excentricity, and semi-major axis, more especially the last, some additional years of observing will be required.

"The most satisfactory set of elements, at which I was able to arrive in 1855, is as follows:—

Apparent Orbit.

$a = 14''.8$	$b = 3''.3$	$e = .95028$
Greater maximum dist. = 25.4	Pos. for do. = 207° 30' ±	
Less do. do. = 4.68	Do. = 3° ±	
Greater minimum dist. = 3.73	Do. = 311° ±	
Less do. do. = .73	Do. = 94° 30' ±	
Area of Ellipse = 153.5 square seconds.		

Real Orbit.

$\tau = 1862.03$
$\pi = 32^\circ 30'$
$\varpi = 14 \ 45$
$\gamma = 77 \ 20$
$\lambda = 55 \ 35$
$e = .85968$
$n = + 4.6655$
Period = 77.16 years
$a = 20''.8945$

Area of projected ellipse = $\pi a^2 \sqrt{1 - e^2} \cos \gamma = 153.7$ square seconds.

"The measures of 1856 imply that the preceding elements will require some modifications, as P_c is getting in advance of P_o , while D_c is beginning to fall short of D_o . Probably, the values of τ , ϖ , γ , e , n and a , will have to undergo changes of about +.6 year, + 2°, - 2°, - .06, - 0°.06 and - 2" respectively. Still the elements given above are more consonant with the observations up to 1855.3. The accompanying Table shows the extent to which an agreement exists between the orbit and observation up to 1855.3.

Epoch.	P _c °	P _o °	P _c —P _o °	D _c "	D _o "	D _c —D _o "	Observer.
1826.4	213 50	213 11	+39	21.92	22.45	—0.53	Dunlop
1832.16	216 57	216 21	+36	19.19	19.85	—0.66	Johnson and Taylor
1833.0	217 28	217 27	+1	18.75	18.67	+0.08	Henderson
1834.79	218 42	218 33	+9	17.73	17.4	+0.33	Herschel
1837.345	220 44	220 44	0	16.18	16.18	0	Herschel
1840.0	223 19	223 10	+9	14.44	14.74	—0.3	{ Maclear Diff. Dec. = 10.74 and P from Curve
1847.09	235 18	235 6	+12	9.26	9.45	—0.19	Jacob
1848.01	237 57	238 0	—3	8.55	8.03	+0.52	Jacob
1850.37	247 16	247 31	—15	6.75	6.52	+0.23	Jacob
1851.05	250 58	251 15	—17	6.25	5.90	+0.35	Jacob
1852.561	261 34	262 46	—72	5.21	5.03	+0.18	Maclear
1853.049	265 54	267 34	—100	4.91	4.55	+0.36	Jacob
1854.029	276 18	276 38	—20	4.39	4.2	+0.19	{ P. by Jacob & Powell, D. by Jacob
1855.047	289 41	289 3	+38	4.00	...	...	Powell
1855.318	293 34	293 38	—4	3.93	4.07	—0.14	Powell

“There is, undoubtedly, error attaching to some one or more of the three positions for 1851, 2, and 3; this is established by the irregularities which the increments of the angular velocities display, and is also indicated by the agreement on this point of all orbits of the star.

“92. *Serpentis*.

Epoch.	Pos.	Observer.
1782.99	227.2	W. Herschel
1821.33	199.22	J. Herschel & South
1829.5	198.4	J. Herschel
1842.35	196.2	Smyth
1853.303	193.07	Powell

“This star is undoubtedly in motion; but, as is remarked in the *Cycle*, its retrogradation is slower than was at first imagined. Perhaps Sir W. Herschel’s angle should be 207.2; if so, all the observations would harmonise pretty well.

“99. *Coronæ Borealis*. Captain Jacob’s orbit for this star, contained in the *Monthly Notices* for April 1855, and my own, published in the *Monthly Notices* for January 1855, approximate to each other in most respects; the chief differences are in the excentricity and mean motion. In my computations I found that the earlier measures favour an increase, and the later a decrease of the mean motion; since the more recent observations are probably the more exact, I am inclined to think that my periodic time is too short, instead of too long, as Captain Jacob’s results imply. However, the lapse of some years is requisite to settle this point.

“108. 70 *Ophiuchi*. I have devoted considerable attention to this binary, as well in investigating its orbit as in measuring its

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position angles ; and while I cannot resist the evidence borne by the results of such accurate observers as the Rev. Mr. Dawes, Captain Jacob, and Mr. Fletcher, with regard to the diminution of the distance, I am unable to reconcile the comparatively great change in that element with the companion's slow motion in angle. I have attempted, but with no good success, to improve upon the orbits I arrived at in 1854, and which appeared in the *Monthly Notices* for December of that year. Although a fresh set of elements, derived from the solution of equations of condition, afforded a better series of distances, the corresponding angular errors were much increased.

"As remarks have been made, assuming that the distance, according to my orbit of 1854, is still on the increase, I may be allowed to mention that such is not the case ; the maximum was reached about two years ago.

"126. *Cycle 836*. This star is well worthy of attention, the *comes* having described an angle of about 6° in a retrograde direction since 1834.79. The distance also has undergone a considerable decrease.

Epoch.	Pos.	Dist.	Observer.
1824.8	274.07	7.98	South.
1834.79	272.1	7.5	Smyth.
1855.873	266.12	6.23	Powell.

"As A's proper motion would produce a variation in the position angle contrary to that which has taken place, and B has had no proper motion assigned to it, there exists a strong probability of the physical connexion of the pair."

Observed Right Ascensions and North Polar Distances of recently discovered small Planets obtained from Meridian Observations at the Royal Observatory, Greenwich.

Victoria.

Mean Solar Time of Observation.	Apparent R.A.	Apparent N.P.D.
1856, April 4 ^{h m s} 8 36 9.3	^{h m s} 9 29 30.49	^{° ' "} 86 55 54.39
7 ^{h m s} 8 24 0.3	^{h m s} 9 29 9.25	^{° ' "} 86 40 34.32

Euphrosyne.

Mean Solar Time of Observation.	Apparent R.A.	Apparent N.P.D.
1856, April 4 ^{h m s} 9 15 36.3	^{h m s} 10 9 3.99	^{° ' "} 47 32 39.78
12 ^{h m s} 8 42 43.0	^{h m s} 10 7 37.73	^{° ' "} 49 21 30.76